FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

CCT R & D Limited

18F., CCT Telecom Building, 11 Wo Shing Street,
Fo Tan, Shatin, N.T.

FCC ID: NC8MD7081

This Report Concerns:	**Equipment Type:**
☒ Original Report	Digital Cordless Telephone System – Base

Test Engineer:	Snell Leong
Report No.:	R0502076(B)
Report Date:	2005-03-03
Reviewed By:	Daniel Deng
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *CCT R & D Limited's*, FCC ID: *NC8MD7081*, or the "EUT" as referred to in this report is the base part of a Digital Cordless Telephone System, which measures approximately 175mmL x 155mm W x 60mm H. The EUT is a DSS device, which operates at the frequency range of 5760.72 – 5838.31MHz, with the maximum conducted output power of 92.68mW.

** The test data gathered are from a production sample, S/N: M78JA-USA GA 1046, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *CCT R & D Limited* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C,.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003& TIA/EIA-603.

Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

Schematics / Block Diagram

Please refer to Appendix A.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Southern Telecom	Telephone	None	None	None
Teltone Corp	Simulator	TLS-3B-01	80071	None

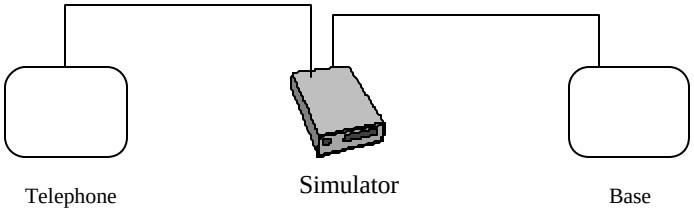
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
None-Shielded RJ-11 Cable	1.5	RJ-11 Port/EUT	Simulator RJ11Port
None-Shielded RJ-11 Cable	1.5	Support telephone	Simulator RJ11Port

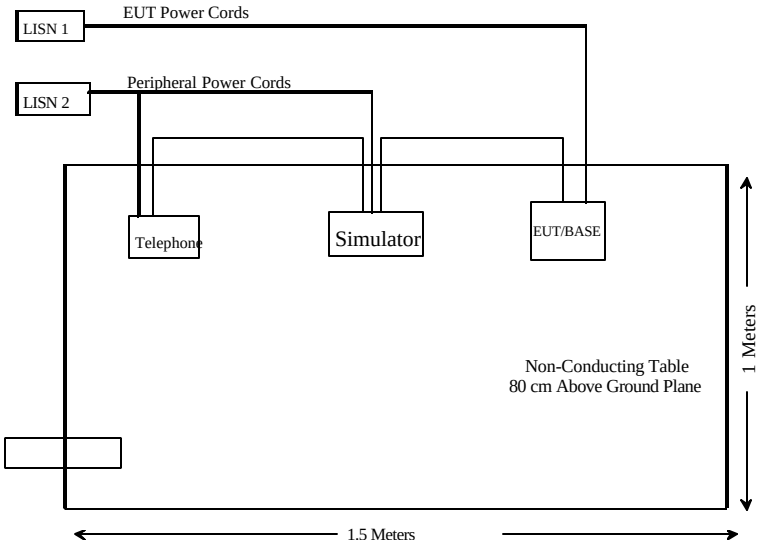
Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
Motorola	AC Adapter	516093-001	DU48090100C	None

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Bands	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (iii)	Dwell Time of Each Frequency within a 10 Second Period of time (0.4 x Number of Channel)	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(4) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant
	Spurious Emission at Antenna Port	Compliant

ANTENNA REQUIREMENT

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The gain of antenna used for transmitting is 0 dBi by default, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm$2.4 dB.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2001 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with LISN-1.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15
Fluke	Calibrated Voltmeter	189	18485-38	2004-07-18

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the mains outlet of the LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Qusi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

**The testing was performed by Snell Leong on 2005-02-15.*

Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

-22.1 dB at **17.900 MHz** in the **Neutral** conductor,

Conducted Emissio ns Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBµV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBµV	Margin dB
17.900	27.9	Ave	Neutral	50.00	-22.1
22.300	27.0	Ave	Neutral	50.00	-23.0
22.300	25.0	Ave	Line	50.00	-25.0
17.900	28.5	QP	Neutral	60.00	-31.5
0.150	34.3	QP	Line	66.00	-31.7
16.500	18.2	Ave	Neutral	50.00	-31.8
22.300	27.2	QP	Neutral	60.00	-32.8
17.900	16.9	Ave	Line	50.00	-33.1
22.300	25.6	QP	Line	60.00	-34.4
16.500	24.2	QP	Neutral	60.00	-35.8
17.900	22.0	QP	Line	60.00	-38.0
0.150	7.9	Ave	Line	56.00	-48.1

Plot of Conducted Emissions Test Data

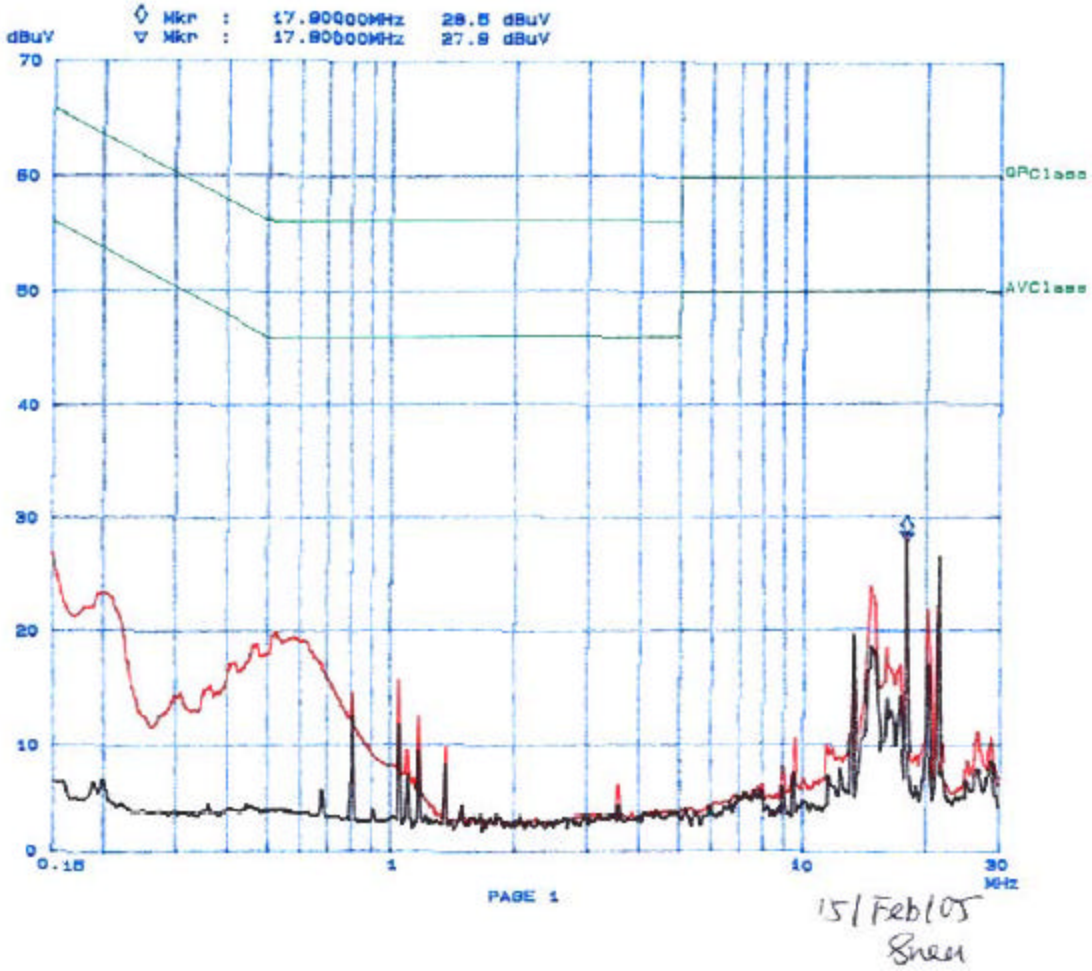
Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Laboratory Corp 15. Feb 05 14:18
Class B

EUT: MD70BX
Manuf: CCT
Op Cond: Normal
Operator: SNELL
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

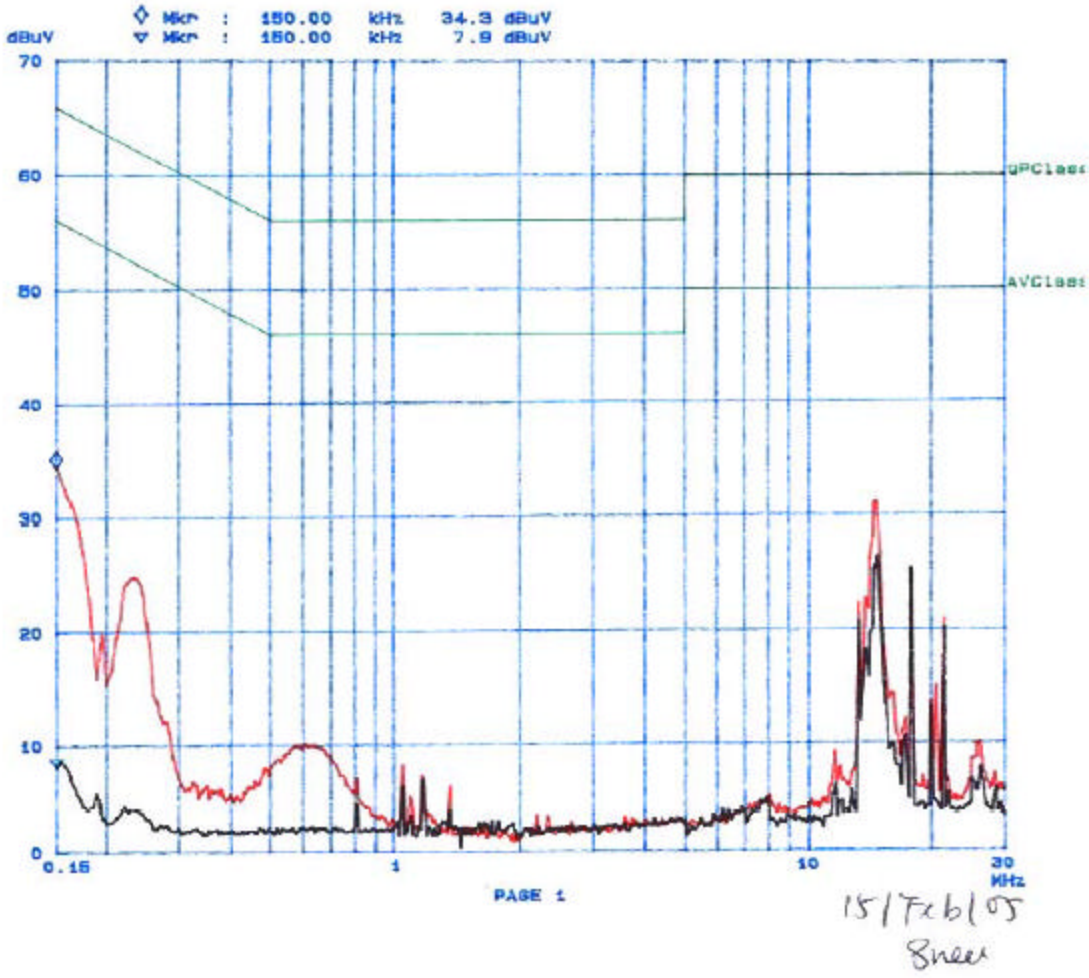


Bay Area Compliance Laboratory Corp 15. Feb 05 10:08
Class B

EUT: MD708X
Manuf: CCT
Op Cond: Normal
Operator: SNELL
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



§15.205 & §15.209 - RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

Test Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 40GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-06-14
HP	Amplifier, Pre	8447E	1937A01057	2004-08-04
Agilent	Analyzer, Spectrum	E4448A	1030645	2004-10-04
ETS	Antenna, Biconical	3110B	9603-2315	2004-01-11
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2004-08-01
EMCO	Antenna, logperiodic	3146	2101	2003-11-08

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

**The testing was performed by Snell Leong on 2005-02-15.*

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

Summary of Test Results

According to the recorded data in following table, the EUT measured -0.7dB margin, within the measurement uncertainty of ±4.0dB, and had the worst margin of:

-1.5 dB at **4881.83 MHz** in the **Vertical** polarization, Low Channel, 3 meters

-0.7 dB at **5123.33 MHz** in the **Vertical** polarization, Middle Channel, 3 meters

-3.2 dB at **5126.65 MHz** in the **Horizontal** polarization, High Channel, 3 meters

-9.8 dB at **130.00 MHz** in the **Vertical** polarization, Unintentional Emission, 3 meters

3 Meters Radiated Emission Test Data

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel											
5760.7200	105.6	180	2.0	v	34.1	3.4	34.5	108.6			Fund/Peak
5760.7200	103.7	0	3.5	h	34.1	3.4	34.5	106.7			Fund/Peak
5760.7200	105.0	180	3.1	v	34.1	3.4	34.5	108.0			Ave
5760.7200	102.1	0	3.5	h	34.1	3.4	34.5	105.1			Ave
4881.8300	51.7	180	2.0	v	32.5	3.1	34.8	52.5	54	-1.5	Ave
5085.3000	49.4	200	3.1	h	33.9	3.2	34.3	52.2	54	-1.9	Ave
5085.3000	46.4	180	2.0	v	33.9	3.2	34.3	49.2	54	-4.8	Ave
11521.4400	32.4	45	2.0	h	39.1	5.4	32.2	44.7	54	-9.3	Ave
4881.8300	43.5	200	3.1	h	32.5	3.1	34.8	44.3	54	-9.7	Ave
11521.4400	31.5	120	2.0	v	39.1	5.4	32.2	43.8	54	-10.2	Ave
11521.4400	48.5	45	2.0	h	39.1	5.4	32.2	60.8	74	-13.2	Peak
4881.8300	59.4	180	2.0	v	32.5	3.1	34.8	60.2	74	-13.8	Peak
5085.3000	55.9	200	3.1	h	33.9	3.2	34.3	58.7	74	-15.4	Peak
11521.4400	44.6	180	2.0	v	39.1	5.4	32.2	56.9	74	-17.1	Peak
5085.3000	53.4	180	2.0	v	33.9	3.2	34.3	56.2	74	-17.8	Peak
4881.8300	51.0	200	3.1	h	32.5	3.1	34.8	51.8	74	-22.2	Peak
2401.6700	65.6	120	1.5	v	28.1	2.0	35.8	59.9	88.6	-28.7	Peak
2401.6700	64.2	120	1.5	v	28.1	2.0	35.8	58.5	88	-29.5	Ave
2401.6700	58.0	200	3.1	h	28.1	2.0	35.8	52.3	85.1	-32.8	Ave
2401.6700	58.7	200	3.1	h	28.1	2.0	35.8	53.0	86.7	-33.7	Peak
Middle Channel											
5799.0700	106.7	180	2.0	v	34.1	3.4	34.5	109.7			Fund/Peak
5799.0700	103.8	0	3.8	h	34.1	3.4	34.5	106.8			Fund/Peak
5799.0700	105.9	180	3.1	v	34.1	3.4	34.5	108.9			Ave
5799.0700	102.8	0	3.5	h	34.1	3.4	34.5	105.8			Ave
5123.3300	50.5	180	2.0	v	33.9	3.2	34.3	53.3	54	-0.7	Ave
5123.3300	50.2	200	3.1	h	33.9	3.2	34.3	53.0	54	-1.0	Ave
4920.1700	51.6	180	2.0	v	32.5	3.1	34.8	52.4	54	-1.6	Ave
4920.1700	49.1	200	3.1	h	32.5	3.1	34.8	49.9	54	-4.1	Ave
11598.1400	31.7	120	2.0	v	39.1	5.4	32.2	44.0	54	-10.0	Ave
11598.1400	31.6	45	2.0	h	39.1	5.4	32.2	44.0	54	-10.0	Ave
5123.3300	58.1	180	2.0	v	33.9	3.2	34.3	60.9	74	-13.1	Peak
4920.1700	60.0	180	2.0	v	32.5	3.1	34.8	60.8	74	-13.2	Peak
5123.3300	57.4	200	3.1	h	33.9	3.2	34.3	60.2	74	-13.9	Peak
4920.1700	55.5	200	3.1	h	32.5	3.1	34.8	56.3	74	-17.7	Peak
11598.1400	43.5	45	2.0	h	39.1	5.4	32.2	55.8	74	-18.2	Peak
11598.1400	42.1	180	2.0	v	39.1	5.4	32.2	54.4	74	-19.6	Peak
2439.8700	65.9	120	1.5	v	28.1	2.0	35.8	60.2	88.9	-28.7	Ave
2439.8700	66.3	120	1.5	v	28.1	2.0	35.8	60.6	89.7	-29.1	Peak
2439.8700	56.5	200	3.1	h	28.1	2.0	35.8	50.8	86.8	-36.0	Peak
2439.8700	54.3	200	3.1	h	28.1	2.0	35.8	48.6	85.8	-37.2	Ave

High Channel											
5838.3100	108.9	180	2.0	v	34.1	3.4	34.5	111.9			Fund/Peak
5838.3100	106.5	0	3.8	h	34.1	3.4	34.5	109.5			Fund/Peak
5838.3100	108.0	180	3.1	v	34.1	3.4	34.5	111.0			Ave
5838.3100	105.8	0	3.5	h	34.1	3.4	34.5	108.8			Ave
5126.6500	48.0	200	3.1	h	33.9	3.2	34.3	50.8	54	-3.2	Ave
5163.2000	46.4	200	3.1	h	33.9	3.2	34.3	49.2	54	-4.8	Ave
5163.2000	44.8	180	2.0	v	33.9	3.2	34.3	47.6	54	-6.4	Ave
5126.6500	42.7	180	2.0	v	33.9	3.2	34.3	45.5	54	-8.5	Ave
11676.6200	32.1	45	2.0	h	39.1	5.4	32.2	44.4	54	-9.6	Ave
11676.6200	31.8	120	2.0	v	39.1	5.4	32.2	44.1	54	-9.9	Ave
5126.6500	55.6	180	2.0	v	33.9	3.2	34.3	58.4	74	-15.6	Peak
5163.2000	54.5	180	2.0	v	33.9	3.2	34.3	57.3	74	-16.7	Peak
5163.2000	54.5	200	3.1	h	33.9	3.2	34.3	57.3	74	-16.7	Peak
5126.6500	54.1	200	3.1	h	33.9	3.2	34.3	56.9	74	-17.2	Peak
11676.6200	41.3	45	2.0	h	39.1	5.4	32.2	53.6	74	-20.4	Peak
11676.6200	40.4	180	2.0	v	39.1	5.4	32.2	52.8	74	-21.2	Peak
2479.1700	58.9	200	3.1	h	28.1	2.0	35.8	53.2	89.5	-36.3	Peak
2479.1700	57.5	200	3.1	h	28.1	2.0	35.8	51.8	88.8	-37.0	Ave
2479.1700	57.7	120	1.5	v	28.1	2.0	35.8	52.0	91	-39.0	Ave
2479.1700	58.5	120	1.5	v	28.1	2.0	35.8	52.7	91.9	-39.2	Peak

Note:

FUND: Fundemental
AVG: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247	
Frequency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
130.00	48.60	90	2.0	V	12.0	1.6	28.5	33.7	43.5	-9.8
130.00	46.30	300	1.8	H	12.0	1.6	28.5	31.4	43.5	-12.1
117.20	45.10	180	1.5	V	11.5	1.6	28.6	29.6	43.5	-13.9
117.20	43.50	180	2.0	H	11.5	1.6	28.6	28.0	43.5	-15.5
75.00	42.50	180	2.6	V	9.4	1.2	28.8	24.2	40.0	-15.8
75.00	41.80	0	2.0	H	9.4	1.2	28.8	23.5	40.0	-16.5

§15.247 (a) (1) - HOPPING CHANNEL SEPARATION

Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

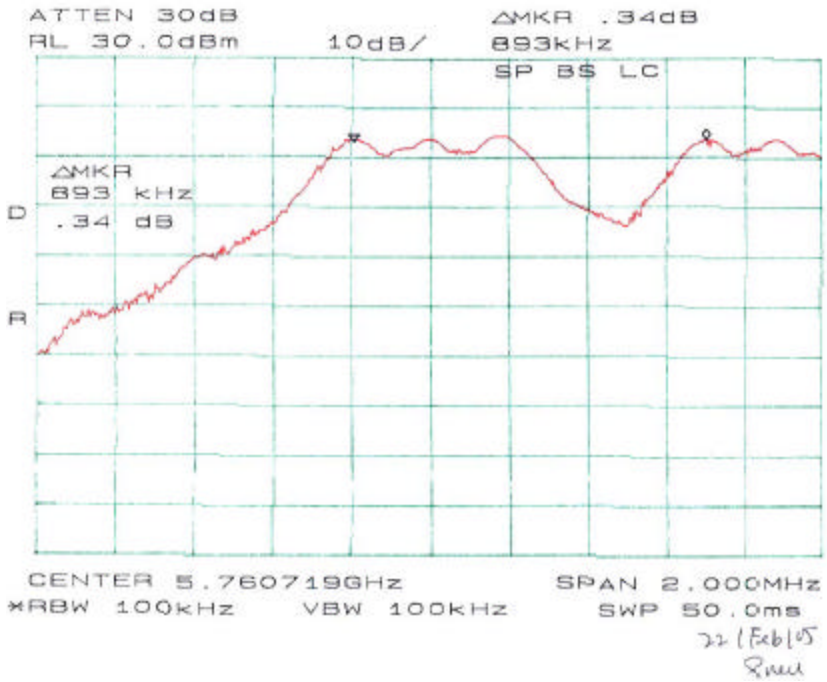
**The testing was performed by Snell Leong on 2005-02-22.*

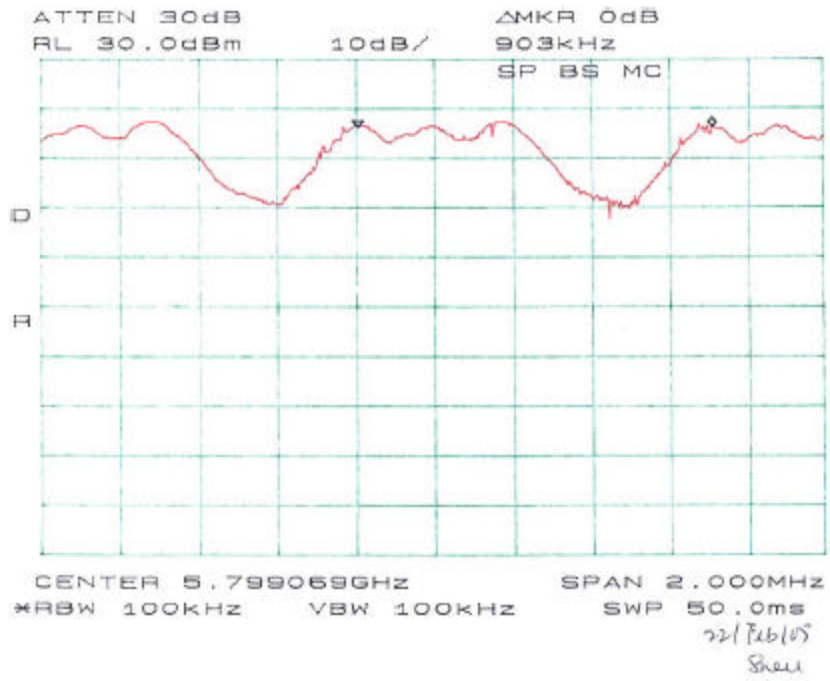
Measurement Results

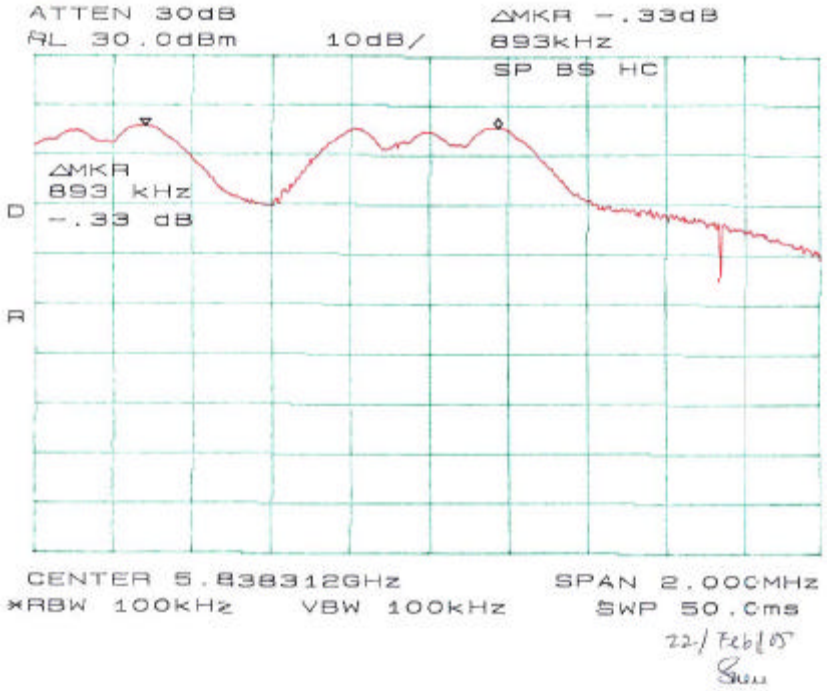
Channel	Frequency MHz	Channel Separation (KHz)
Low	5760.72	893
Mid	5799.96	903
High	5838.31	893

Plots of Hopping Channel Separation

Please see the following plots






ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -.33dB
893kHz
SP BS HC
ΔMKR
893 kHz
-.33 dB
D
R
CENTER 5.838312GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
22/Feb/05

§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(l), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

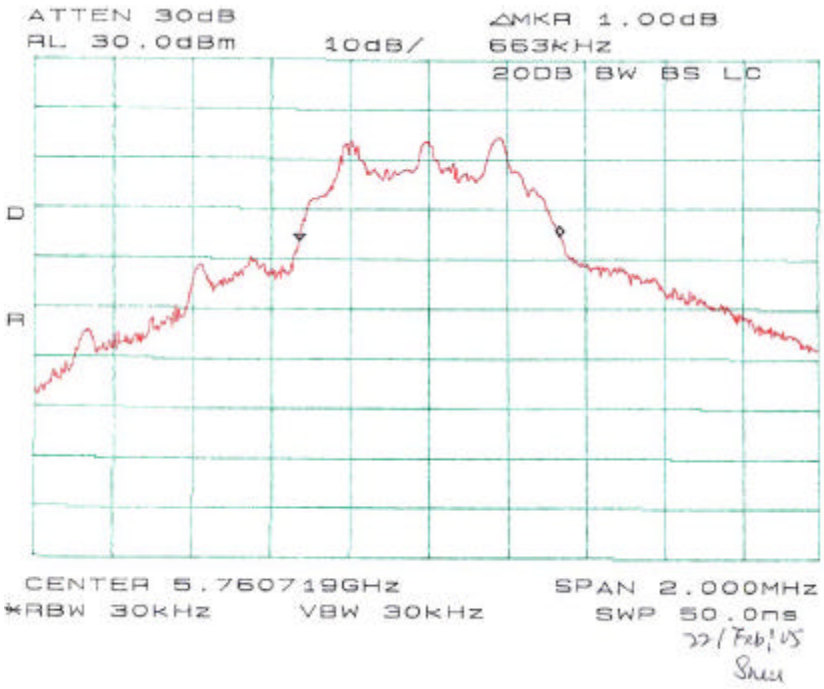
**The testing was performed by Snell Leong on 2005-02-22.*

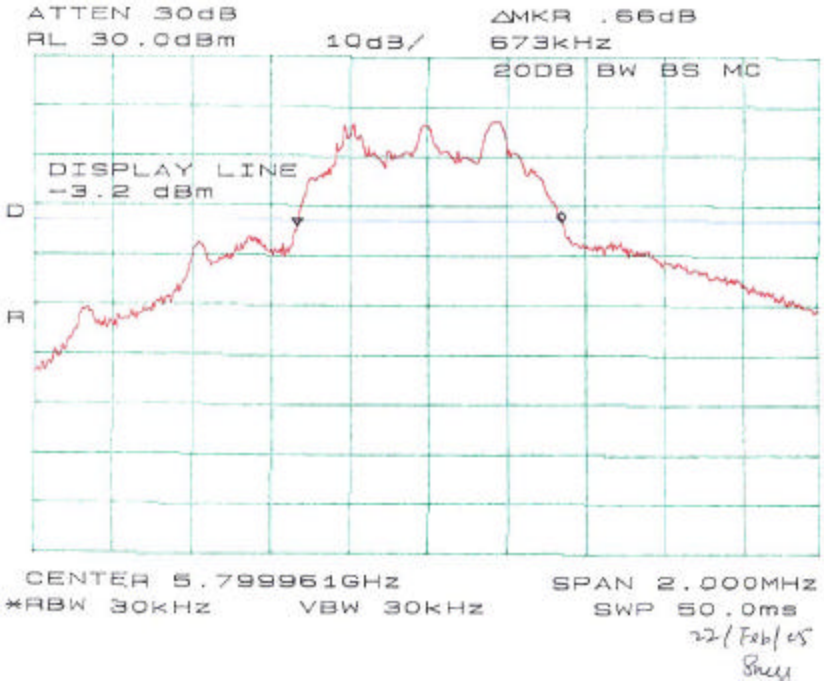
Measurement Result

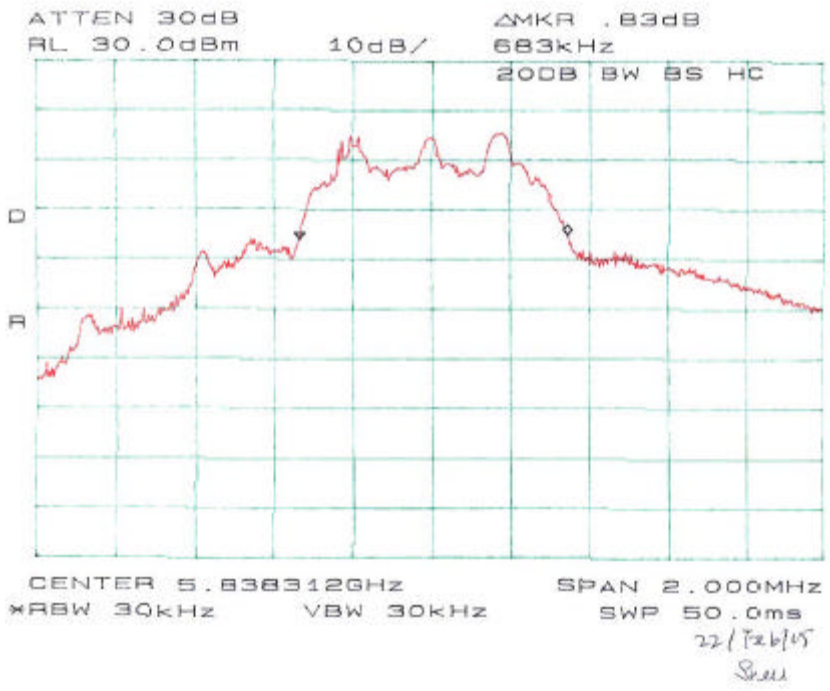
Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	5760.72	663
Mid	5799.96	673
High	5838.31	683

Plot of Channel Bandwidth

Please see the following plots


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR 1.00dB
663kHz
20DB BW BS LC
D
R
CENTER 5.760719GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms
22/Feb/05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .66dB
673kHz
20DB BW BS MC
DISPLAY LINE
-3.2 dBm
D
R
CENTER 5.799961GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms
22/Feb/05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .83dB
683kHz
20DB BW BS HC
D
R
CENTER 5.838312GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms
22/Feb/15

§15.247 (a) (1) (iii) - NUMBER OF HOPPING FREQUENCY USED

Standard Applicable

According to §15.247(a)(1)(ii), frequency hopping systems operating in the 5725-5850MHz band shall use at least 75 hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

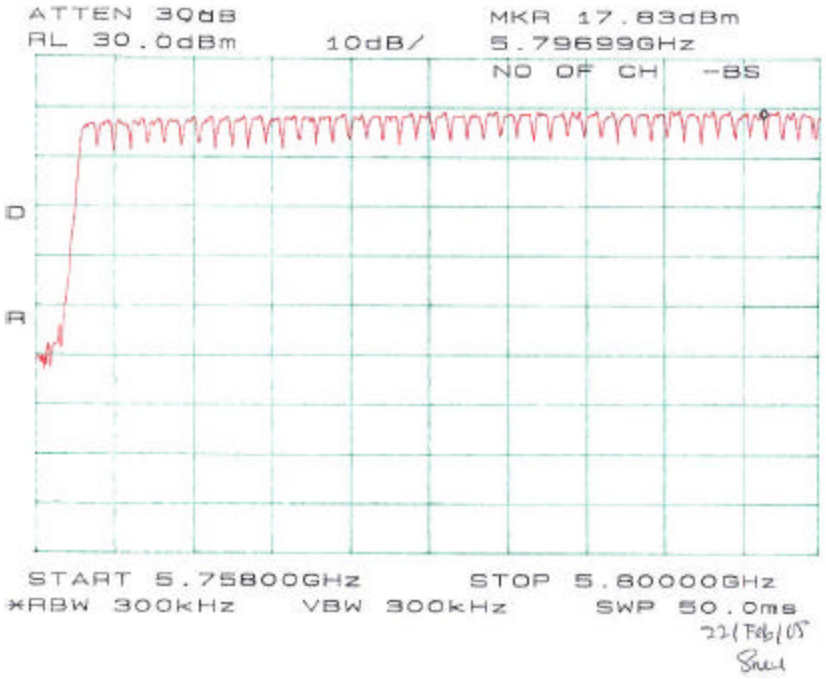
**The testing was performed by Snell Leong on 2005-02-22.*

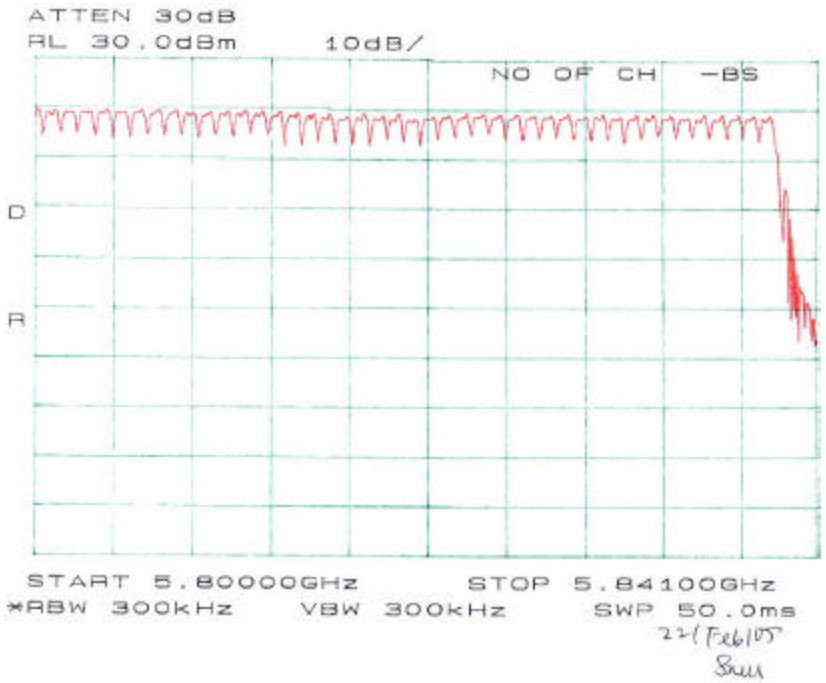
Measurement Results

Measurement	Standard	Result
88	88	Compliant

Plots of Number of Hopping Frequency

Please refer to the following plots.


ATTEN 30dB
RL 30.0dBm
10dB/
MKR 17.83dBm
5.796990GHz
NO OF CH -BS
D
R
START 5.75800GHz
STOP 5.80000GHz
*RBW 300kHz
VBW 300kHz
SWP 50.0ms
22(Feb)05
Shan


ATTEN 30dB
RL 30.0dBm
10dB/
NO OF CH -BS
D
R
START 5.80000GHz
STOP 5.84100GHz
*RBW 300kHz
VBW 300kHz
SWP 50.0ms
22(Feb)05
Shan

§15.247 9 (a) (1) (iii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(ii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

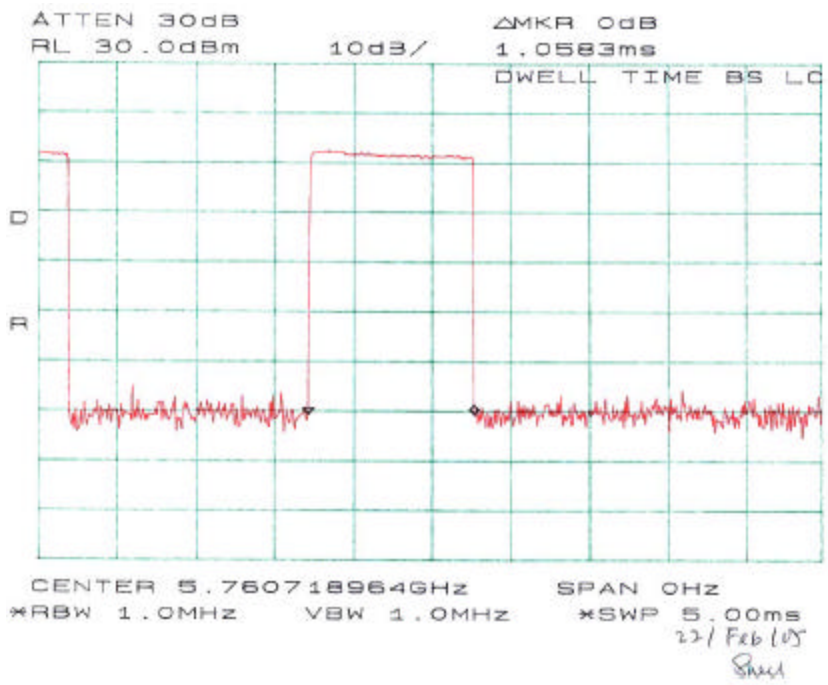
**The testing was performed by Snell Leong on 2005-02-22.*

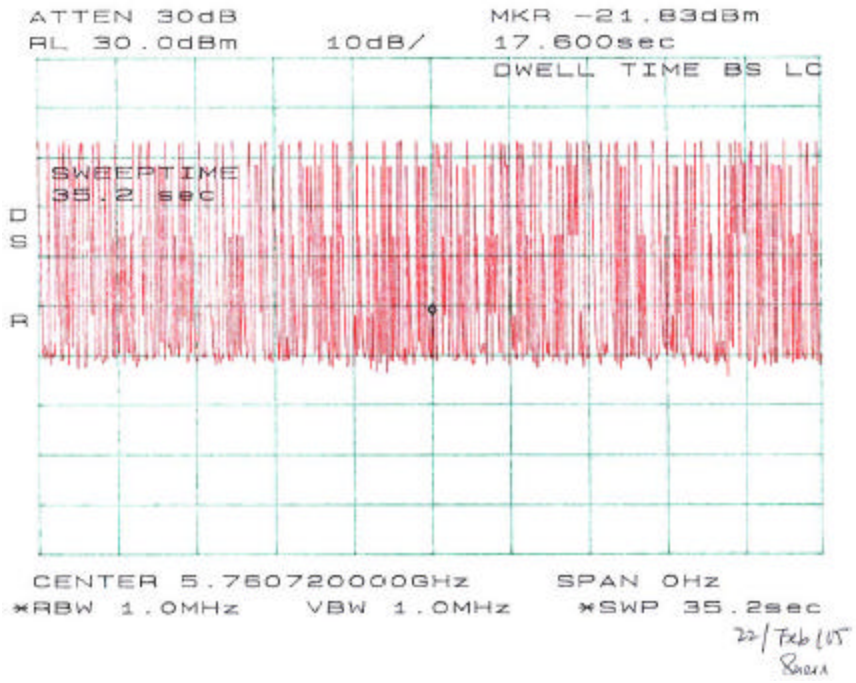
Measurement Results

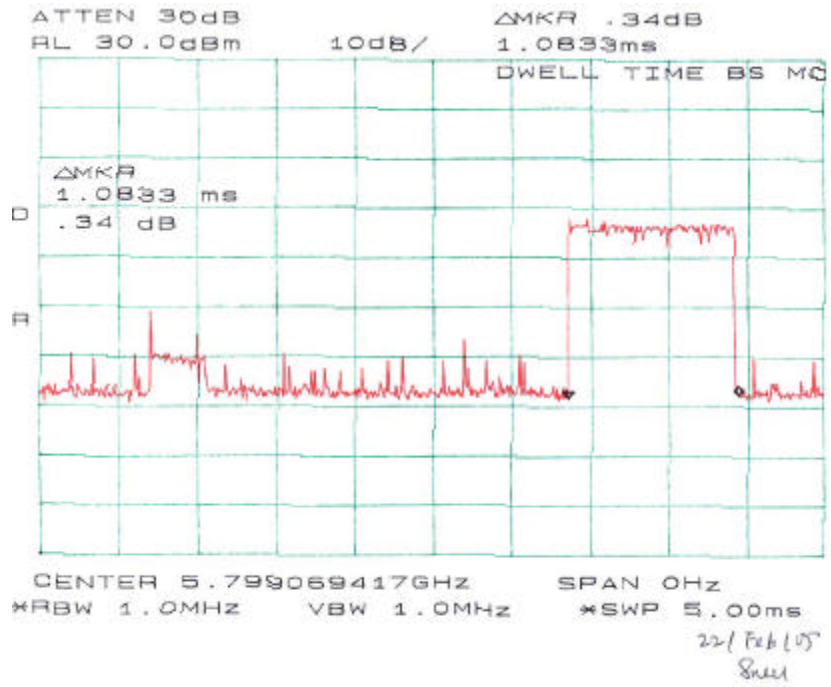
Channel	Frequency MHz	Pulse Wide uSec	Occupied time per Sec	Dwell Time Sec	Limit Sec
Low	5760.72	1058.3	82	0.087	0.4
Mid	5799.96	1083.3	81	0.088	0.4
High	5838.31	1083.3	81	0.088	0.4

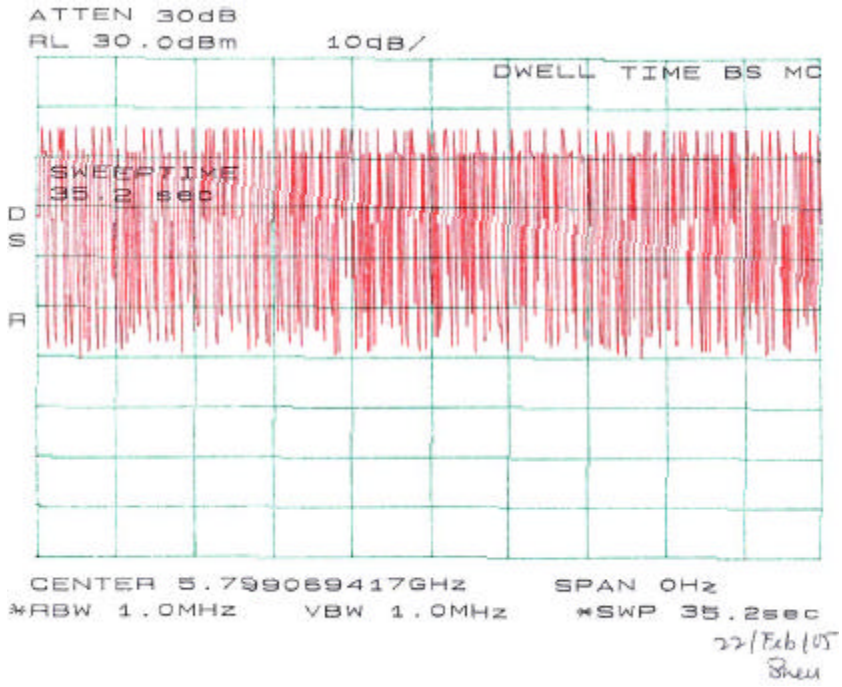
Low CH Dwell time =	1058.3 x 47 =	0.087	micro sec
Mid CH Dwell time =	1083.3 x 48 =	0.088	micro sec
High CH Dwell time =	1083.3 x 47 =	0.088	micro sec

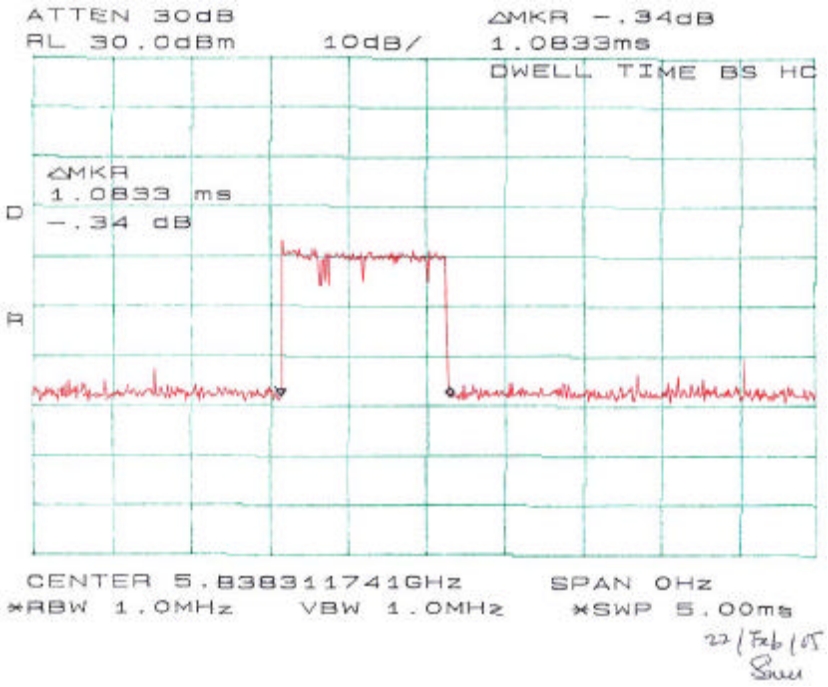
Plots of Dwell Time
Please refer the following plots.

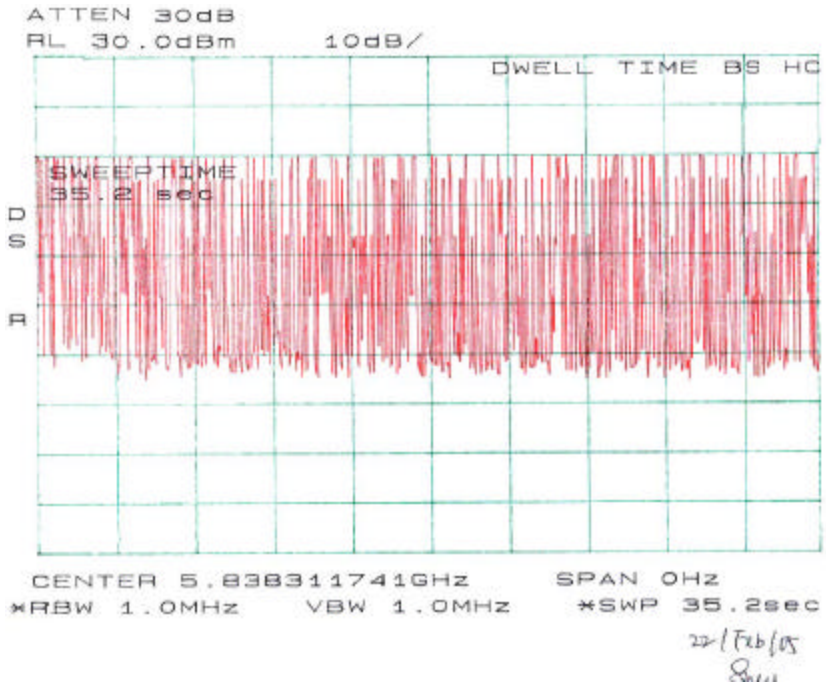

ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR 0dB
1.0583ms
DWELL TIME BS LC
D
R
CENTER 5.760718964GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 5.00ms
22/ Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
MKR -21.83dBm
17.600sec
DWELL TIME BS LC
SWEEPTIME
35.2 sec
D
S
R
CENTER 5.760720000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 35.2sec
22/ Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .34dB
1.0833ms
DWELL TIME BS MC
ΔMKR
1.0833 ms
.34 dB
D
A
CENTER 5.799069417GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 5.00ms
22/Feb/05
Shell


ATTEN 30dB
RL 30.0dBm
10dB/
DWELL TIME BS MC
SWEEPTIME
35.2 sec
D
S
A
CENTER 5.799069417GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 35.2sec
22/Feb/05
Shell


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -.34dB
1.0833ms
DWELL TIME BS HC
ΔMKR
1.0833 ms
-.34 dB
D
R
CENTER 5.838311741GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 5.00ms
22/Feb/05


ATTEN 30dB
RL 30.0dBm
10dB/
DWELL TIME BS HC
SWEEPTIME
35.2 sec
D
S
R
CENTER 5.838311741GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 35.2sec
22/Feb/05

§15.247 (b) (1) - MAXIMUM PEAK OUTPUT POWER

Standard Applicable

According to §15.247(b) (1), for all frequency hopping systems in the 5725-5850 MHz band, the maximum peak output power of the transmitter shall not exceed 1 Watt.

Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

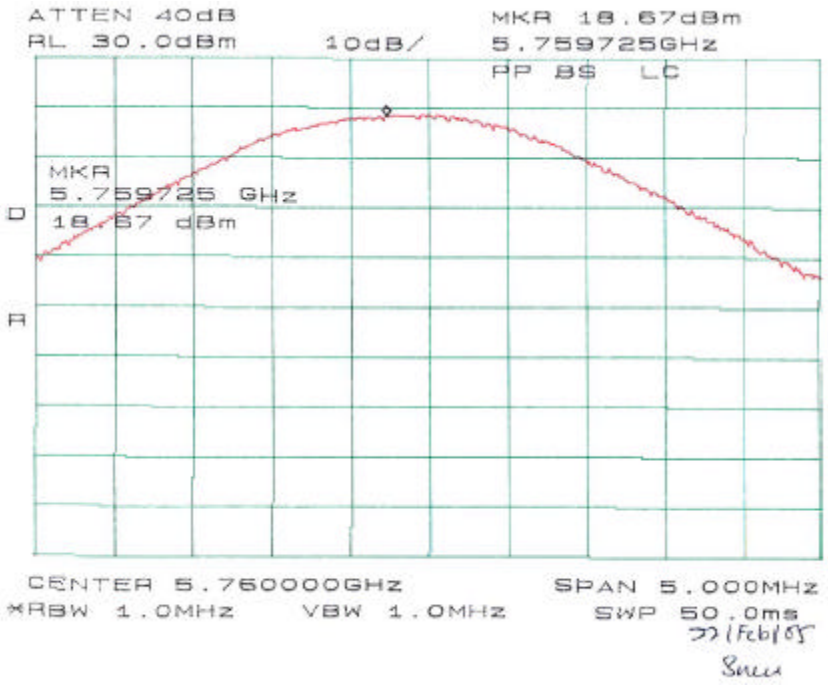
**The testing was performed by Snell Leong on 2005-02-22.*

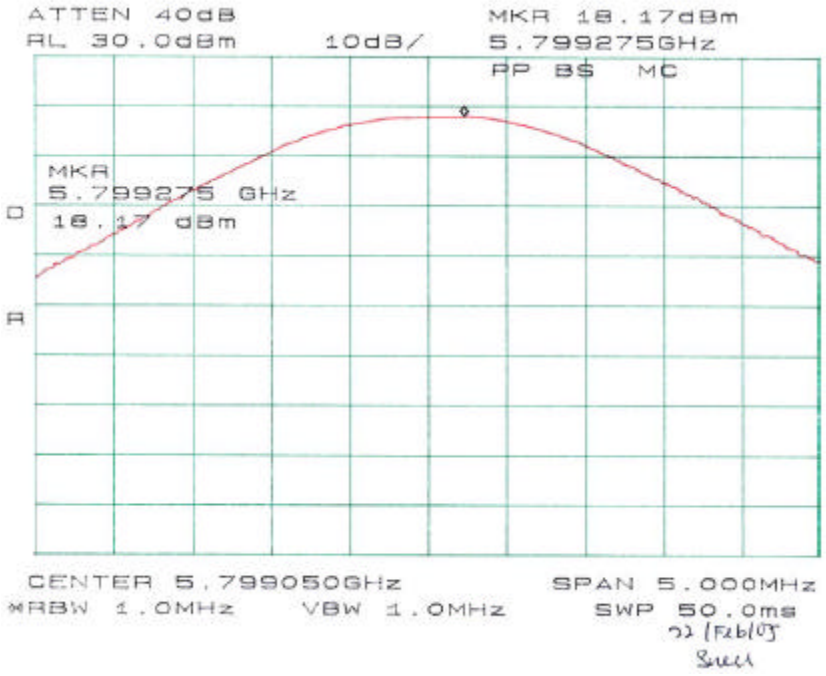
Measurement Result

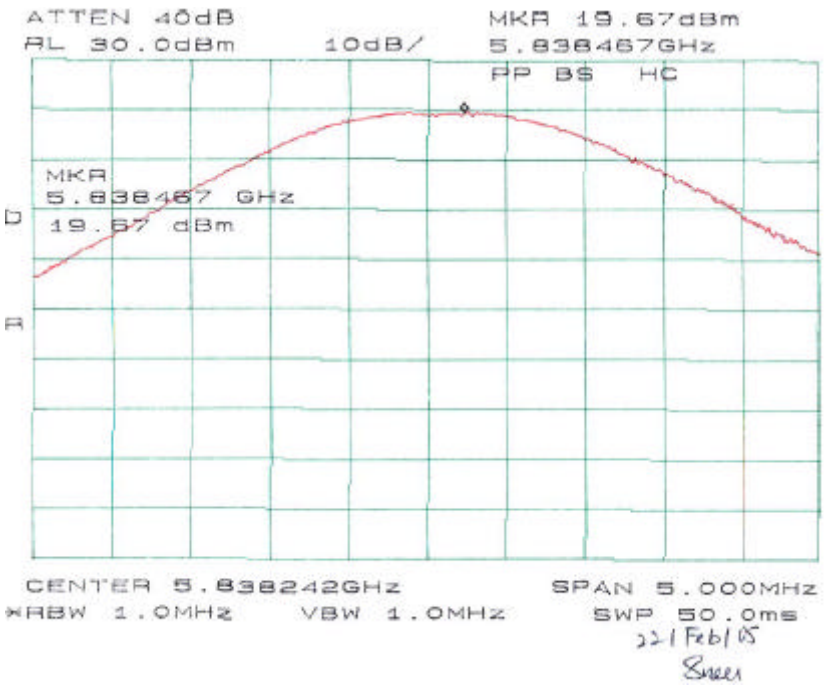
Channel	Frequency	Max Peak Output Power		Limit	Result
	MHz	(dBm)	(m Watt)	(m Watt)	
Low	5760.72	18.67	73.62	1000	pass
Mid	5799.961	17.17	52.12	1000	pass
High	5838.31	19.67	92.68	1000	pass

Plots of Maximum Peak Output Power

Please refer to following plots.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 18.67dBm
5.759725GHz
PP BS LC
MKR
5.759725 GHz
18.67 dBm
CENTER 5.760000GHz
SPAN 5.000MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
22 Feb 05


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 18.17dBm
5.799275GHz
PP BS MC
MKR
5.799275 GHz
18.17 dBm
CENTER 5.799050GHz
SPAN 5.000MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
22 Feb 05


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 19.67dBm
5.838467GHz
PP BS HC
MKR
5.838467 GHz
19.67 dBm
D
R
CENTER 5.838242GHz
SPAN 5.000MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
22 Feb 05

§15.247 (c) - 100 KHZ BANDWIDTH OF BAND EDGES

Standard Applicable

According to §15.247(c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

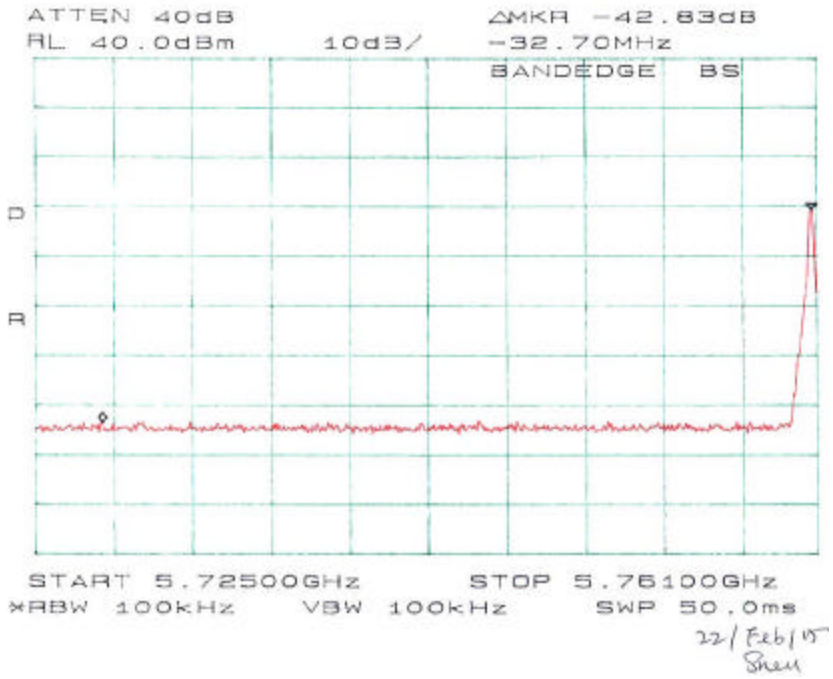
Environmental Conditions

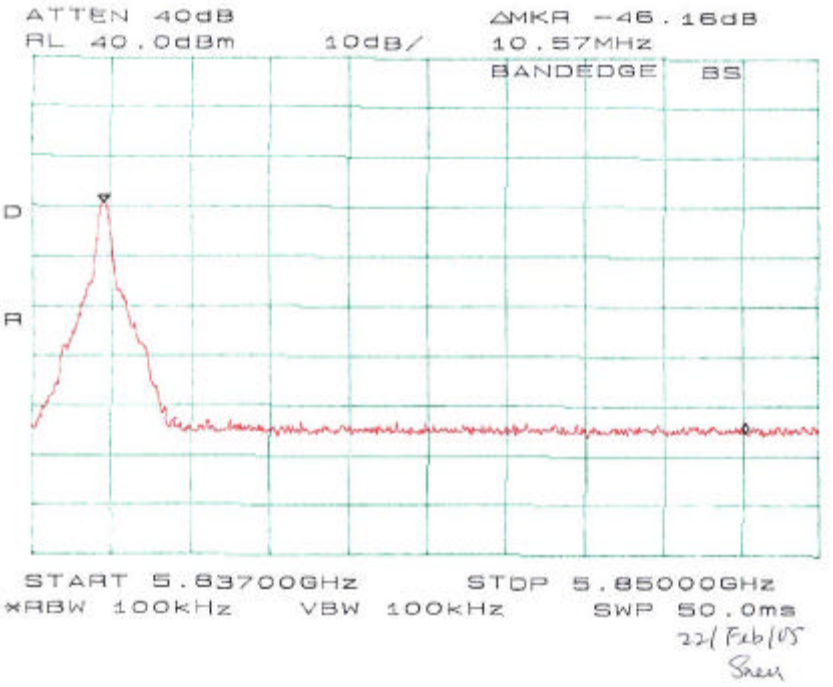
Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

**The testing was performed by Snell Leong on 2005-02-22.*

Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.


ATTEN 40dB
RL 40.0dBm
10dB/
ΔMKR -42.83dB
-32.70MHz
BANDEDGE BS
D
R
START 5.72500GHz
STOP 5.76100GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
22/Feb/05
Shen


ATTEN 40dB
RL 40.0dBm
10dB/
ΔMKR -46.16dB
10.57MHz
BANDEDGE BS
D
R
START 5.83700GHz
STOP 5.85000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
22/Feb/05
Shen

SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-10-04
HP	Plotter	HP7470A	2541A49659	Not Required

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

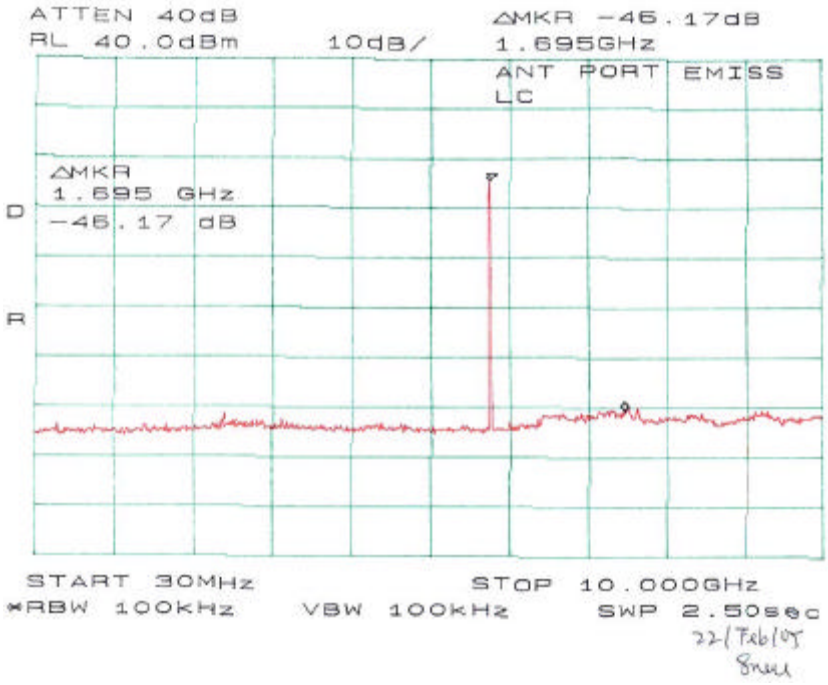
Environmental Conditions

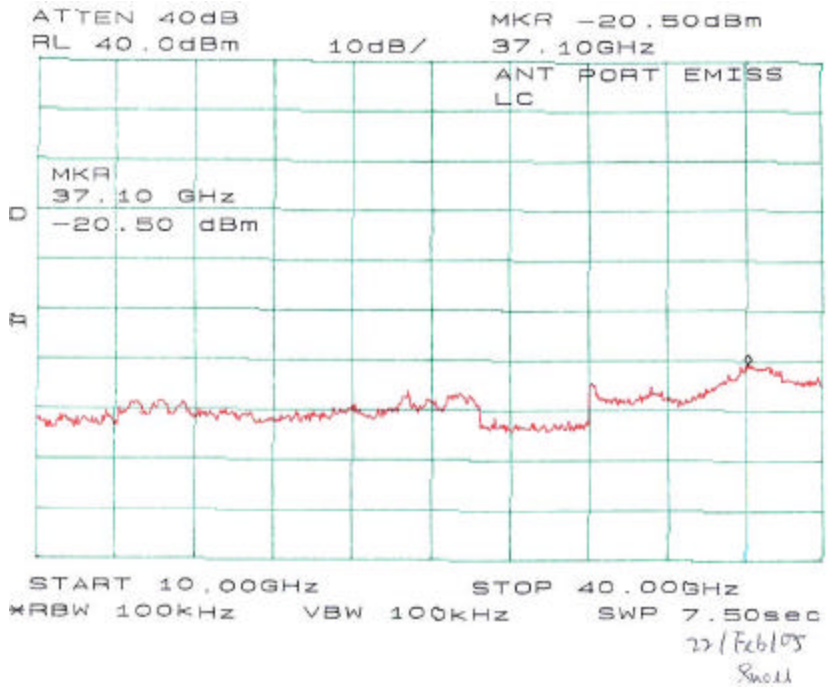
Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

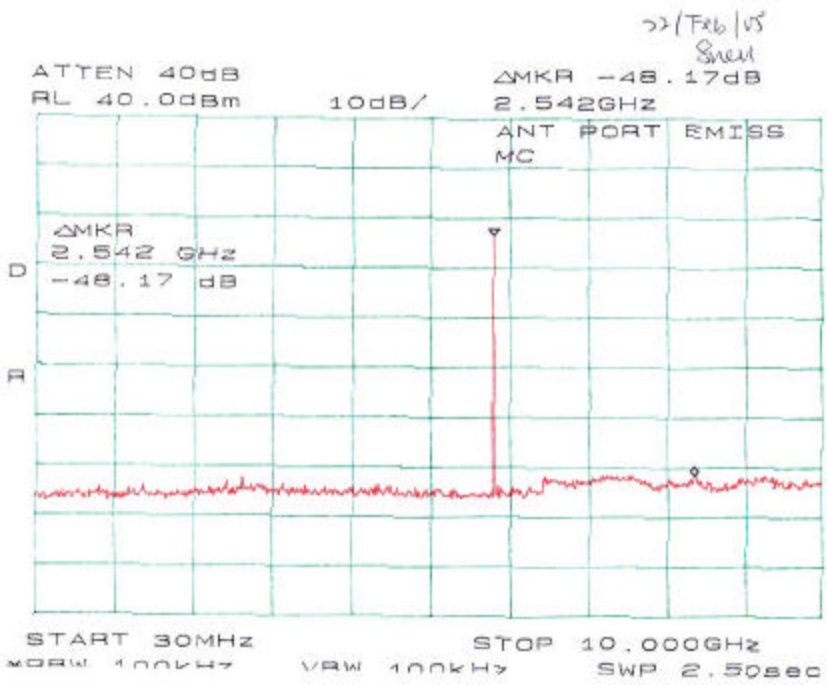
**The testing was performed by Snell Leong on 2005-02-22.*

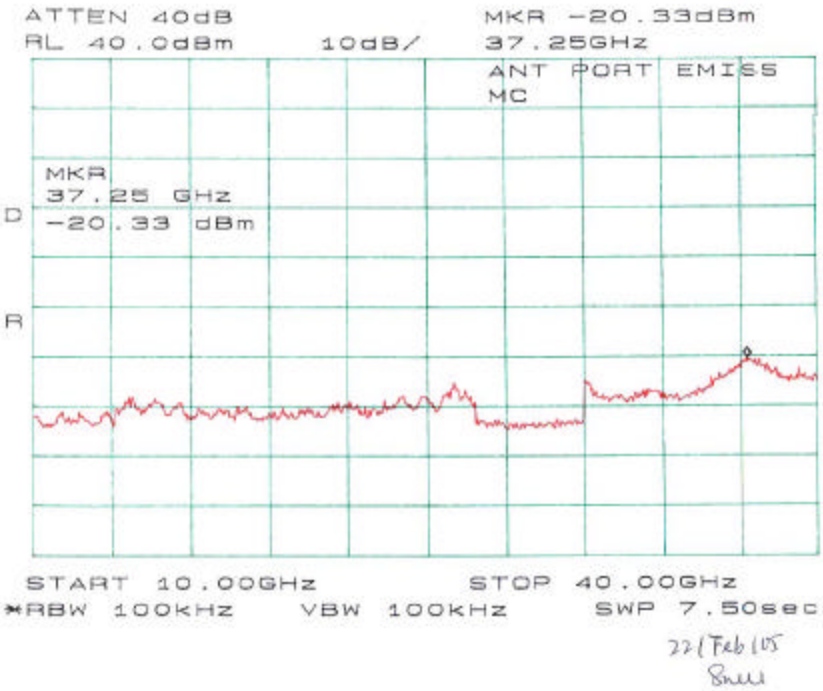
Measurement Results

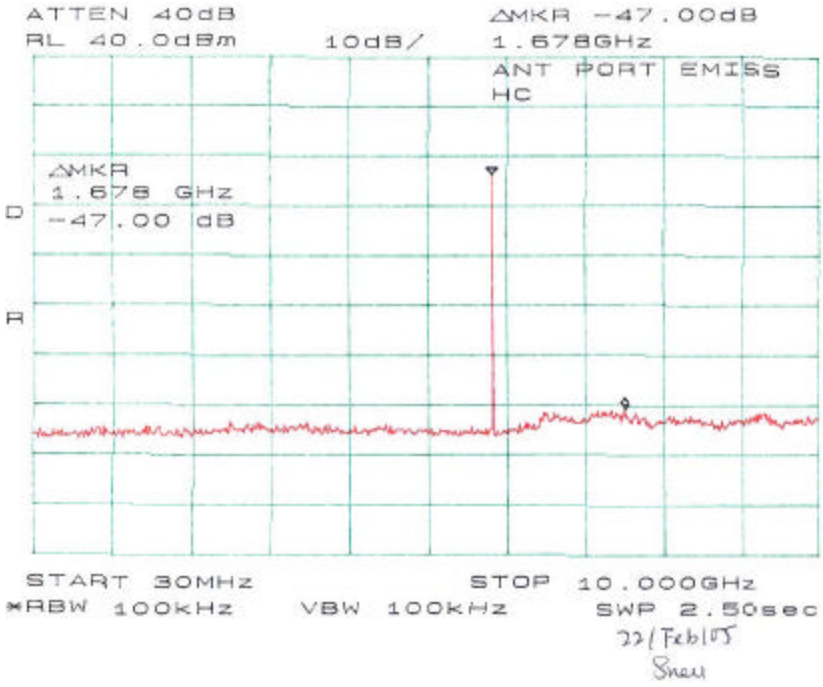
Please refer to the following plots.

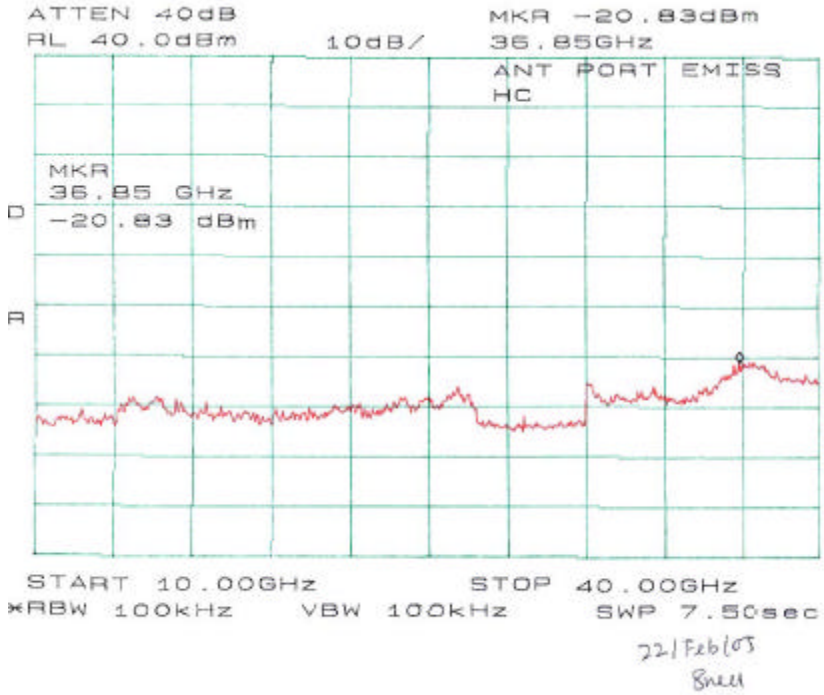

ATTEN 40dB
RL 40.0dBm
10dB/
ΔMKR -46.17dB
1.695GHz
ANT PORT EMISS
LC
ΔMKR
1.695 GHz
-46.17 dB
D
R
START 30MHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 2.50sec
22/Feb05
Sneil


ATTEN 40dB
RL 40.0dBm
10dB/
MKR -20.50dBm
37.10GHz
ANT PORT EMISS
LC
MKR
37.10 GHz
-20.50 dBm
D
R
START 10.00GHz
STOP 40.00GHz
*RBW 100kHz
VBW 100kHz
SWP 7.50sec
22/Feb05
Sneil


22/Feb/05
Shen
ATTEN 40dB
RL 40.0dBm
10dB/
ΔMKR -48.17dB
2.542GHz
ANT PORT EMISS
MC
ΔMKR
2.542 GHz
-48.17 dB
D
R
START 30MHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 2.50sec


ATTEN 40dB
RL 40.0dBm
10dB/
MKR -20.33dBm
37.25GHz
ANT PORT EMISS
MC
MKR
37.25 GHz
-20.33 dBm
D
R
START 10.00GHz
STOP 40.00GHz
*RBW 100kHz
VBW 100kHz
SWP 7.50sec
22/Feb/05
Shen


ATTEN 40dB
RL 40.0dBm
10dB/
ΔMKR -47.00dB
1.678GHz
ANT PORT EMISS
HC
ΔMKR
1.678 GHz
-47.00 dB
D
R
START 30MHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 2.50sec
22/Feb/05
Sheu


ATTEN 40dB
RL 40.0dBm
10dB/
MKR -20.83dBm
36.85GHz
ANT PORT EMISS
HC
MKR
36.85 GHz
-20.83 dBm
D
R
START 10.00GHz
STOP 40.00GHz
*RBW 100kHz
VBW 100kHz
SWP 7.50sec
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